

WHAT IS CLAIMED IS:

1. A current driver integrated on a semiconductor chip, comprising:

5 a first current distribution MISFET of a first conductivity type, a source of the first current distribution MISFET being supplied with a supply voltage;

a first current input MISFET of a second conductivity type, a drain of the first current input MISFET being connected to a drain of the first current distribution MISFET, the drain and a gate electrode of the first current input MISFET being connected to each other;

10 a second current input MISFET of a second conductivity type, the second current input MISFET and the first current input MISFET constituting a current mirror circuit, a drain and a gate electrode of the second current input MISFET being connected to each other;

a first bias line for connecting the gate electrode of the first current input MISFET and the gate electrode of the second current input MISFET;

15 a plurality of current supply sections each including a current source MISFET, the current source MISFET, the first current input MISFET and the second current input MISFET constituting a current mirror circuit, a gate electrode of the current source MISFET being connected to the first bias line;

20 a second current distribution MISFET of the first conductivity type, the second current distribution MISFET and the first current distribution MISFET constituting a current mirror circuit, a drain of the second current distribution MISFET being connected to the drain of the second current input MISFET;

a third current distribution MISFET provided adjacent to the second current distribution MISFET, the third current distribution MISFET, the first current distribution

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MISFET and the second current distribution MISFET constituting a current mirror circuit;
and

a first current output terminal which is connected to a drain of the third
current distribution MISFET.

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2. The current driver of claim 1, wherein the distance between the second current
distribution MISFET and the third current distribution MISFET is equal to or shorter than
200 μm .

10 3. The current driver of claim 1, further comprising a bias power supplying terminal which
is connected to the gate electrode of the second current distribution MISFET and the gate
electrode of the third current distribution MISFET.

4. The current driver of claim 1, further comprising:

15 at least one additional current distribution MISFET of the first conductivity
type provided in a region of the semiconductor chip which is distant from the third current
distribution MISFET by 200 μm or less, the additional current distribution MISFET, the
second current distribution MISFET and the third current distribution MISFET constituting
a current mirror; and

20 an additional current output terminal which is connected to each of the at
least one additional current distribution MISFET.

5. The current driver of claim 1, further comprising:

a first cascode MISFET of the first conductivity type which is provided
25 between the first current distribution MISFET and the first current input MISFET;

a second cascode MISFET of the first conductivity type which is provided between the second current distribution MISFET and the second current input MISFET;

a third cascode MISFET of the first conductivity type which is provided between the third current distribution MISFET and the first current output terminal; and

5 a first gate bias line which is commonly connected to the gate electrodes of the first cascode MISFET, the second cascode MISFET and the third cascode MISFET, one end of the first gate bias line being connected to the first constant-voltage power supply.

10 6. The current driver of claim 1, further comprising:

a fourth cascode MISFET of the second conductivity type which is provided between the first current distribution MISFET and the first current input MISFET, the drain of the fourth cascode MISFET being connected to the gate electrode of the first current input MISFET;

15 a fifth cascode MISFET of the second conductivity type which is provided between the second current distribution MISFET and the second current input MISFET, the drain of the fifth cascode MISFET being connected to the gate electrode of the second current input MISFET;

a sixth cascode MISFET which is connected to drains of the current source
20 MISFETs; and

a second gate bias line which is commonly connected to the gate electrode of the fourth cascode MISFET, the gate electrode of the fifth cascode MISFET and the gate electrode of the sixth cascode MISFET, one end of the second gate bias line being connected to a second constant-voltage power supply.

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7. The current driver of claim 1, further comprising a current input terminal which is connected to a line connecting the first current distribution MISFET to the first current input MISFET,

wherein the values of a/b , c/d and e/b are substantially equal where a is the W/L ratio of the first current distribution MISFET, b is the W/L ratio of the first current input MISFET, c is the W/L ratio of the second current distribution MISFET, d is the W/L ratio of the second current input MISFET, and e is the W/L ratio of the third current distribution MISFET.

8. A current driver integrated on a semiconductor chip, comprising:

a first current input terminal;

a first current input MISFET of a first conductivity type, a drain of the first current input MISFET being connected to the first current input terminal, and the drain and gate electrode of the first current input MISFET being connected to each other;

a plurality of current supply sections including current source MISFETs of the first conductivity type, the current source MISFETs and the first current input MISFET constituting a current mirror circuit; and

a bias line which is commonly connected to the gate electrode of the first current input MISFET and the gate electrodes of the current source MISFETs.

9. The current driver of claim 8, further comprising:

a second current input MISFET of the first conductivity type, a drain and gate electrode of the second current input MISFET being connected to each other, the second current input MISFET and the first current input MISFET constituting a current

mirror circuit between which the plurality of current supply sections are provided;

a bias power input terminal;

a first current distribution MISFET of the second conductivity type, a gate electrode of the first current distribution MISFET being connected to the bias power input terminal, the drain of first current distribution MISFET being connected to the drain of the
5 second current input MISFET;

a second current distribution MISFET provided in a region of the semiconductor chip which is distant from the first current distribution MISFET by 200 μm or less, the second current distribution MISFET and the first current distribution MISFET constituting a current mirror;

10 a first current output terminal which is connected to the drain of the second current distribution MISFET; and

a first bias power output terminal which is connected to the gate electrode of the second current distribution MISFET.

15 10. The current driver of claim 8, further comprising:

a third current input MISFET of the first conductivity type, a drain and gate electrode of the third current input MISFET being connected to each other, the third current input MISFET and the first current input MISFET constituting a current mirror circuit between which the plurality of current supply sections are provided; and

20 a second current input terminal which is connected to the drain of the third current input MISFET.

11. The current driver of claim 8, further comprising:

a first cascode MISFET of the first conductivity type which is provided
25 between the first current input MISFET and the first current input terminal;

a second cascode MISFET which is connected to drains of the current source MISFETs; and

a gate bias line which is commonly connected to the gate electrode of the first cascode MISFET and the gate electrode of the second cascode MISFET, one end of the gate bias line being connected to a constant-voltage power supply.

12. The current driver of claim 8, further comprising:

a current output MISFET of the first conductivity type, a gate electrode of the current output MISFET being connected between the gate electrode of the first current input MISFET and the gate electrodes of the current source MISFETs;

a current-voltage converter which is connected to a drain of the current output MISFET;

a fourth current input MISFET of the first conductivity type, a drain and gate electrode of the fourth current input MISFET being connected to each other, the fourth current input MISFET and the first current input MISFET constituting a current mirror circuit between which the plurality of current supply sections are provided;

a third current distribution MISFET having a gate electrode connected to the current-voltage converter and a drain connected to the fourth current input MISFET;

a fourth current distribution MISFET provided in a region of the semiconductor chip which is distant from the third current distribution MISFET by 200 μm or less, the fourth current distribution MISFET and the third current distribution MISFET constituting a current mirror; and

a second current output terminal which is connected to a drain of the fourth current distribution MISFET.

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13. The current driver of claim 12, wherein the current-voltage converter is a fifth current distribution MISFET, a drain and gate electrode of the fifth current distribution MISFET being connected to each other, the drain of the fifth current distribution MISFET being connected to the current output MISFET, the fifth current distribution MISFET, the third
5 current distribution MISFET and the fourth current distribution MISFET constituting a current mirror circuit.

14. A current driver integrated on a semiconductor chip, comprising:

a first current distribution MISFET of a first conductivity type, a source of
10 the first current distribution MISFET being supplied with a supply voltage;

a current input MISFET of a second conductivity type, a drain of the current input MISFET being connected to a drain of the first current distribution MISFET, the drain and gate electrode of the current input MISFET being connected to each other;

a current input/output MISFET of the second conductivity type, a drain and
15 gate electrode of the current input/output MISFET being connected to each other, the current input/output MISFET and the current input MISFET constituting a current mirror circuit;

a first bias line for connecting the gate electrode of the current input MISFET and the gate electrode of the current input/output MISFET;

20 a plurality of current supply sections including current source MISFETs, gate electrodes of the current source MISFETs being connected to the first bias line, the current source MISFETs, the current input MISFET and the current input/output MISFET constituting a current mirror circuit;

a second current distribution MISFET of the first conductivity type, a drain
25 of the second current distribution MISFET being connected to the drain of the current

input/output MISFET;

a current-voltage converter connected to at least the gate electrode and source of the second current distribution MISFET and provided in a region of the semiconductor chip which is distant from the second current distribution MISFET by

5 200 μm or less; and

a current input/output terminal which is connected to the current-voltage converter.

15. The current driver of claim 14, wherein:

10 the first current distribution MISFET and the second current distribution MISFET constitute a current mirror circuit; and

the current-voltage converter is connected to the gate electrode and source of the first current distribution MISFET.

15 16. The current driver of claim 14, further comprising:

a load circuit provided in a region of the semiconductor chip which is distant from the current-voltage converter by 200 μm or less; and

a current output terminal which is connected to the load circuit.

20 17. The current driver of claim 14, wherein the load circuit is a first conductivity type MISFET whose drain and gate electrode are connected to each other or a resistor.

18. The current driver of claim 14, wherein the current-voltage converter is one of a first conductivity type MISFET whose drain and gate electrode are connected to each other, a
25 resistor, and a buffer.

19. A display device comprising a first semiconductor chip which includes a first current driver and a second semiconductor chip which include a second current driver and is provided adjacent to the first semiconductor chip, wherein:

5 the first current driver includes

 a first current distribution MISFET of a first conductivity type, a source of the first current distribution MISFET being supplied with a supply voltage,

 a first current input MISFET of a second conductivity type, a drain of the first current input MISFET being connected to a drain of the first current distribution
10 MISFET, the drain and a gate electrode of the first current input MISFET being connected to each other,

 a second current input MISFET of the second conductivity type, the second current input MISFET and the first current input MISFET constituting a current mirror circuit, a drain and a gate electrode of the second current input MISFET being
15 connected to each other,

 a first bias line for connecting the gate electrode of the first current input MISFET and the gate electrode of the second current input MISFET,

 a plurality of first current supply sections each including a first current source MISFET, the first current source MISFET, the first current input MISFET
20 and the second current input MISFET constituting a current mirror circuit, a gate electrode of the first current source MISFET being connected to the first bias line,

 a second current distribution MISFET of the first conductivity type, the second current distribution MISFET and the first current distribution MISFET constituting a current mirror circuit, a drain of the second current distribution MISFET
25 being connected to the drain of the second current input MISFET,

a third current distribution MISFET provided in a region which is distant from the second current distribution MISFET by 200 μm or less, the third current distribution MISFET, the first current distribution MISFET and the second current distribution MISFET constituting a current mirror circuit, and

5 a first current output terminal which is connected to a drain of the third current distribution MISFET; and

the second current driver includes

a first current input terminal which is connected to the first current output terminal,

10 a third current input MISFET of the second conductivity type, a drain of the third current input MISFET being connected to the first current input terminal, and the drain and gate electrode of the third current input MISFET being connected to each other,

a plurality of second current supply sections including second
15 current source MISFETs, the second current source MISFETs and the third current input MISFET constituting a current mirror circuit, and

a second bias line which is commonly connected to the gate electrode of the third current input MISFET and the gate electrodes of the second current source MISFETs.

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20. The display device of claim 19, wherein the values of a/b , c/d and e/f are substantially equal where a is the W/L ratio of the first current distribution MISFET, b is the W/L ratio of the first current input MISFET, c is the W/L ratio of the second current distribution MISFET, d is the W/L ratio of the second current input MISFET, e is the W/L ratio of the
25 third current distribution MISFET, and f is the W/L ratio of the third current input

MISFET.

21. The display device of claim 19, wherein:

the first current driver further includes a bias power supplying terminal
5 which is connected to the gate electrode of the second current distribution MISFET and the
gate electrode of the third current distribution MISFET; and

the second current driver further includes

a fourth current input MISFET of the second conductivity type, a
drain and gate electrode of the fourth current input MISFET being connected to each other,
10 the fourth current input MISFET and the third current input MISFET constituting a current
mirror circuit between which the plurality of second current supply sections are provided,

a bias power input terminal which is connected to the bias power
supplying terminal, and

a fourth current distribution MISFET of the first conductivity type, a
15 gate electrode of the fourth current distribution MISFET being connected to the bias power
input terminal, a drain of the fourth current distribution MISFET being connected to a
drain of the fourth current input MISFET.

22. The display device of claim 19, wherein:

20 the first current driver includes

at least one additional current distribution MISFET of the first
conductivity type provided in a region of the first semiconductor chip which is distant from
the third current distribution MISFET by 200 μm or less, the additional current distribution
MISFET, the second current distribution MISFET and the third current distribution
25 MISFET constituting a current mirror, and

an additional current output terminal which is connected to each of the at least one additional current distribution MISFET; and

the second current driver includes

a fifth current input MISFET of the second conductivity type, a drain and gate electrode of the fifth current input MISFET being connected to each other, the fifth current input MISFET and the third current input MISFET constituting a current mirror circuit between which the plurality of second current supply sections are provided, and

a second current input terminal which is connected to the drain of the fifth current input MISFET and the additional current output terminal.

23. A display device comprising a first semiconductor chip which includes a first current driver and a second semiconductor chip which include a second current driver and is provided adjacent to the first semiconductor chip, wherein:

the first current driver includes

a first current distribution MISFET of a first conductivity type, a source of the first current distribution MISFET being supplied with a supply voltage,

a first current input MISFET of a second conductivity type, a drain of the first current input MISFET being connected to a drain of the first current distribution MISFET, the drain and gate electrode of the first current input MISFET being connected to each other,

a current input/output MISFET of the second conductivity type, a drain and gate electrode of the current input/output MISFET being connected to each other, the current input/output MISFET and the first current input MISFET constituting a current mirror circuit,

a first bias line for connecting the gate electrode of the first current input MISFET and the gate electrode of the current input/output MISFET,

a plurality of first current supply sections including current source MISFETs, gate electrodes of the current source MISFETs being connected to the first bias line, the current source MISFETs, the first current input MISFET and the current input/output MISFET constituting a current mirror circuit,

a second current distribution MISFET of the first conductivity type, a drain of the second current distribution MISFET being connected to the drain of the current input/output MISFET,

10 a first current-voltage converter connected to the gate electrode and source of the second current distribution MISFET and a reference power supply and provided in a region of the semiconductor chips which is distant from the second current distribution MISFET by 200 μm or less, and

a current input/output terminal which is connected to the first current-voltage converter,

the second current driver includes

a current input terminal which is connected to the current input/output terminal,

a second current-voltage converter which is connected in series to the first current-voltage converter through the current input terminal,

a third current distribution MISFET of the first conductivity type, a source and gate electrode of the third current distribution MISFET being connected to the second current-voltage converter,

a second current input MISFET of the second conductivity type which is connected to the drain of the third current distribution MISFET, and

a plurality of second current supply sections including second current source MISFETs, the second current source MISFETs and the second current input MISFET constituting a current mirror circuit.

- 5 24. A display device comprising a first semiconductor chip which includes a first current driver and a second semiconductor chip which include a second current driver and is provided adjacent to the first semiconductor chip, wherein:

the first current driver includes

- 10 a first current distribution MISFET of a first conductivity type, a source of the first current distribution MISFET being supplied with a supply voltage,

a first current input MISFET of a second conductivity type, a drain of the first current input MISFET being connected to a drain of the first current distribution MISFET, the drain and gate electrode of the first current input MISFET being connected to each other,

- 15 a current input/output MISFET of the second conductivity type, a drain and gate electrode of the current input/output MISFET being connected to each other, the current input/output MISFET and the current input MISFET constituting a current mirror circuit,

- 20 a first bias line for connecting the gate electrode of the first current input MISFET and the gate electrode of the current input/output MISFET,

a plurality of first current supply sections including first current source MISFETs, gate electrodes of the first current source MISFETs being connected to the first bias line, the first current source MISFETs, the first current input MISFET and the current input/output MISFET constituting a current mirror circuit,

- 25 a second current distribution MISFET of the first conductivity type,

a drain of the second current distribution MISFET being connected to the drain of the current input/output MISFET,

a first current-voltage converter connected to the gate electrode and source of the second current distribution MISFET and a reference power supply and
5 provided in a region of the first semiconductor chip which is distant from the second current distribution MISFET by 200 μm or less,

a first current input terminal which is connected to the first current-voltage converter,

a first load circuit provided in a region of the first semiconductor
10 chip which is distant from the first current-voltage converter by 200 μm or less, and

a first current output terminal which is connected to the load circuit;
and

the second current driver includes

a second current output terminal which is connected to the first
15 current input terminal,

a second load circuit which is connected in series to the first current-voltage converter through the first current input terminal,

a second current input terminal which is connected to the first current output terminal,

20 a second current-voltage converter which is connected in series to the first load circuit through the first current output terminal,

a third current distribution MISFET of the first conductivity type, a source and gate electrode of the third current distribution MISFET being connected to the second current-voltage converter,

25 a second current input MISFET of the second conductivity type

which is connected to a drain of the third current distribution MISFET, and

a plurality of second current supply sections including second current source MISFETs, the second current source MISFETs and the second current input MISFET constituting a current mirror circuit.